Fruit and Vegetable Intake in SNAP Beneficiaries and Its Association with Perceived Health

By

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Abstract

Introduction

Food scarcity is a common problem within the United States, prompting multiple efforts at the federal, state, and local levels working to alleviate food insecurity and the physical, mental, and social health disparities with which it is associated. One such program, Double Up Food Bucks (DUFB), incentivizes the purchase of local fruits and vegetables through matched dollars for Supplemental Food and Nutrition Assistance Program (SNAP) users. Few studies have examined the impact that this incentive program has on buying practices among this population, with even fewer focusing on the possible relationships that these buying practices have upon this population's self-perceived health.

Methods

A secondary analysis was performed on data from an ongoing study conducted by Dr. Cheryl Gibson and her research team at the University of Kansas Medical Center in which SNAP users were surveyed to determine whether they had used DUFB in addition to generating a snapshot of their usual buying practices, fruit and vegetable intake, and self-identified level of health. This secondary analysis focused on perceived importance of fruit and vegetable intake for health in relation to self-reported intake, fruit and vegetable intake in relation to self-reported health, food security status in relation to fruit and vegetable intake, store type and transportation most commonly used to purchase fruits and vegetables, and the impact of perceived importance of locally sourced produce on store type utilization.

Results

DUFB participants did not differ significantly from non-DUFB respondents with respect to age (p=0.84) or race/ethnicity (p=0.058). While nearly all (i.e., 139 of 142) DUFB respondents indicated that fruits and vegetables are important for health, fruit intake ranged from 0-8 daily servings and 0.5-20 daily servings of vegetables. Only self-reported "poor" health showed a statistically significant correlation with diminished fruit intake (p=0.023). There was insufficient evidence to conclude that a relationship existed between reported health and whether or not respondent's reported intakes met the 2015-2020 Dietary Guidelines for Americans recommendations for fruit (p=0.620) and vegetables (p=0.804). Intake in relation to level of food security showed no statistically significant correlation. The majority of DUFB users shopped at supermarkets (n=127) and the majority of DUFB users drove themselves to the store (n=61 for all users; n=38 for insecure) with no statistically significant relationship between store type utilized and method of travel used to access it (p=0.214). Self-perceived importance of purchasing locally sourced produce did not have statistically significant impact on store type utilized (p=0.904).

Conclusion

Reported importance of fruit and vegetable intake did not appear to influence self-reported intake levels in the DUFB population sample. With the exception of "poor" health and diminished fruit intake, self-reported intake does not have an impact on self-reported health even when factoring in food security status, dietary guideline recommendations and survey location. Food security status did not impact fruit and vegetable intake in this sample. Self-reported intake among the DUFB group was higher than the national average for fruit intake, comparable to the national average for vegetable intake, and appears higher than intake for both in comparison to

SNAP eligible non-DUFB populations in Kansas and Missouri, suggesting that DUFB participants are eating more fruits and vegetables than their non-DUFB counterparts. Stores utilized for produce purchases were independent of travel method and ranked importance of purchasing locally sourced fruits and vegetables, indicating that these factors do not impact the motivations for choosing store types in this sample.

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Chapter 1: Justification

Food scarcity is not an uncommon phenomenon (18, 35, 52, 58, 88). The presence of food deserts, areas where food sources are not available within an accommodating distance, is an indication of this fact. The United States Department of Agriculture (USDA) definition of a food desert, "neighborhoods that lack healthy food sources", is dependent upon indicators of access such as accessibility to sources of healthy food, individual-level resources that may affect accessibility, and neighborhood-level indicators of resources (1). Diminished access to nutritionally adequate food sources has been linked to poorer health and an increase in risk for developing obesity, type 2 diabetes, and cardiovascular disease as well as social and mental health disparities. Diet quality is difficult to maintain in instances where access is limited, further increasing the risk of experiencing these disease states. Specifically within the United States, steps have been taken to address the issue of food insecurity on the federal, state, and local level. Federal programs such as The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP) allow for the purchase of pre-approved foods. Programs such as Double Up Food Bucks allow for dollars that are spent on local foods to be matched by USDA grants. Communities take it upon themselves to fill the need for food at the local level by maintaining farmers' markets.

Due to their prevalence, food deserts are a common subject for research as are the community aid programs that have been initiated to alleviate the burden that they pose. However, there is minimal information available regarding the method in which people access these programs or the perceived importance of the fruits and vegetables that they provide in relation to food security and self-reported health.

While the bulk of food desert research focuses on the level of access to food and the associated implications, there is very little published research regarding the perceived health status among incentive-based purchasing programs. Therefore, the purpose of this observational study is to examine the perceived health of Double Up Food Bucks (DUFB) shoppers and determine whether there is a relationship between their reported health status and other factors including level of food insecurity, type of store utilized, and perceived importance of fruit and vegetable intake and reported actual intake. The following questions will be examined:

- Does perceived importance of fruit and vegetables for health influence fruit and vegetable intake among Double Up Food Bucks participants?
- What is the relationship between fruit and vegetable intake and self-reported health among Double Up Food Bucks participants?
- Is there a relationship between food security status and reported intake of fruits and vegetables?
- Secondary:
    - Where do Double Up Food Bucks participants shop for fruits and vegetables?
    - What mode of transport do Double Up Food Bucks participants use to travel to their primary food source?
    - Is there a relationship between the type of store that this demographic uses to purchase fruits and vegetables and the perceived importance of purchasing locally grown produce?

The hypotheses for these questions are as follows:

- Those with a higher perception of importance of fruits and vegetables for health will report themselves to be healthier.
- Those with a higher perception of importance of fruits and vegetables for health will report higher intake of fruits and vegetables than those with a low perception of importance.
- Individuals with higher intake of fruits and vegetables will report higher levels of health when compared to those who report low intakes.
- Those who utilize Double Up Food Bucks will report poorer health among food insecure individuals than among food secure individuals.
- Food insecure individuals will report lower intakes of fruits and vegetables than their food secure counterparts.
- Participants will report that they do the bulk of their shopping at supermarkets.
- The majority of Double Up Food Bucks shoppers will travel via personal vehicle.
- Participants with higher ranked importance of purchasing locally grown fruits and vegetables will be more likely to utilize farmers' markets as their primary source for purchasing produce.

The information examined over the course of the observational period will focus on residents of Lawrence and Kansas City in Kansas and Kansas City and St. Louis in Missouri.

Chapter 2: Review of Literature

Kansas City as a Food Desert

As of 2009, multiple areas of the Kansas City metropolitan area have been deemed food deserts, with large stretches of Jackson and Clay counties in Missouri and Wyandotte and Johnson counties in Kansas where affordable and nutritious foods are lacking from a range of a few blocks to several mile expanses (35). Changes in retailer availability have also had a profound impact on these areas, including the closure of a Price Chopper, a grocery store in Wyandotte County that served as the only WIC-approved location within a several mile span and one of the few available stores on a local bus route.

One way that Kansas City has dealt with the widespread food deserts has been to increase the availability of farmers' markets throughout the city, some serving year-round and many running on alternating days throughout the week to allow for greater access. The use of farmers' markets as a way to improve access has been examined in a number of studies and has been directly associated with improvements in levels of food security and consumption of fruits and vegetables, particularly in low-income groups (86) (49) (46).

Assistance Programs Available

The USDA defines food insecurity as "*uncertainty of having, or inability to acquire, enough food to meet the requirements of all members of a household because of financial or resource constraint*" (11). These conditions are most prevalent among households at or below the poverty line, with rural households and those with children more likely to experience food insecurity; in 2013, approximately 14.3% of American households were classified as food-insecure at some time in the year (86) (30).

Several federal programs have been established to help alleviate food insecurity across the United States. SNAP and WIC are two programs that provide benefits that are redeemed on food for people in need (36, 87). SNAP, The Supplemental Nutrition Assistance Program, allows for government assistance with purchasing foods in eligible stores (87). In order to be eligible for SNAP assistance, households must meet income standards of a gross monthly income of less than or equal to 130% of the poverty line or a net monthly income of less than or equal to 100% of the poverty line (87). There is also a limit to the countable resources that a family can have to be eligible for assistance: $2,250 or $3,250 if at least one person is over the age of 60 or disabled (87). For stores to be eligible, they must either *"(A) Offer for sale, on a continuous basis, at least three varieties of qualifying foods in each of the following four staple food groups, with perishable foods in at least two of the categories: meat, poultry or fish, bread or cereal, vegetables or fruits, and dairy products OR (B) More than one-half (50%) of the total dollar amount of all retail sales (food, nonfood, gas and services) sold in the store must be from the sale of eligible staple foods (87).*"

SNAP is the largest food assistance program in the United States, providing more than $75 million in benefits to nearly 48 million people (nearly 1 in 7 Americans) with the average recipient receiving $125 per month (73) (87) (12) (76). SNAP participation has continued to grow in recent years; US households saw an increase of 10.4% in SNAP participation in the year between July 2010 and July 2011 (61) (3). The program also serves approximately 27% of all American children, with 45% of SNAP participation comprised of individuals under the age of 18 and 9% above the age of 60 (17) (93) (73) (87).

In addition to providing funds for food, SNAP also includes education for participants to encourage utilization for healthy purchases; in the 2015 fiscal year, SNAP-Ed was authorized

with $407 million to provide nutrition education and obesity prevention (17) (6). The Agricultural Act of 2014 also provided $100 million in grants to Food Insecurity and Nutrition Incentives projects that aim to encourage purchasing of fruits and vegetables among SNAP participants (17) (38). These efforts are of particular importance due to current SNAP fund utilization. While studies have shown that participation in SNAP has significantly reduced food insecurity, additional studies have linked participation to increased likelihood of weight gain and obesity among women in particular (73) (65) (76) (3) (32) (21). In comparing SNAP participants to non-participants of similar socioeconomic status, several studies have found that those who participate in SNAP exhibit lower diet quality, higher intake of sugar sweetened beverages and higher intake of high fat meats (76) (75) (17) (23) (60). Leung et al. found that in relation to health disparities, those who participated in SNAP were more positively associated with obesity, higher waist circumference in both men and women, decreased HDL, elevated triglycerides, higher fasting glucose, and increased prevalence of metabolic syndrome (61).

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is similar to SNAP in that it provides for food paid for by government sources, however WIC is directed specifically at pregnant, postpartum, or breastfeeding women and their children under the age of 5 that are found to be at nutritional risk (36). The foods supplied through WIC are restricted to specific items because they contain nutrients that are vital to children's developmental periods. This includes foods such as milk, whole grains, eggs, peanut butter, fruits and vegetables (36). In addition to providing food, WIC also provides nutrition education and health care referrals (36).

Health Incentives Pilot Program

One program in particular that was designed to help direct purchases for the greater SNAP population was the Health Incentives Pilot Program, known as HIP. Conducted through the USDA and authorized through the Food, Conservation, and Energy Act of 2008 , HIP encouraged the consumption of healthy foods by matching 30 cents for every dollar that SNAP participants spent on fruits and vegetables that was then added back to their electronic balance transfer (EBT) card (20). By encouraging fruit and vegetable purchases through incentives at the point of sale, HIP participants exhibited a 26% increase in self-reported fruit and vegetable consumption, with an increase of over ¼ cup each over non-participants (20).

Double Up Food Bucks

State programs such as Double Up Food Bucks have also been employed to assist SNAP beneficiaries in purchasing more fruits and vegetables. Funded through the USDA's Food Insecurity Nutrition Incentive program, Double Up Food Bucks allows for the matching of dollars spent on local produce purchased through SNAP (27). Up to $25 of the SNAP dollars that consumers spend on locally sourced produce is returned in the form of tokens or vouchers that can then be used to purchase additional fruits and vegetables (27). This benefits the local economy by increasing the money that goes to the producers as well as encouraging the purchase of healthy foods among low-income families. Anyone who qualifies for SNAP benefits also qualifies for Double Up Food Bucks (27). This program is being initiated at farmers' markets and some chain grocery stores such as Price Chopper, with over 140 locations implementing the program within Kansas and Missouri in 2017(27). Nationally, Double Up Food Bucks is accepted at over 575 sites in 23 states; in addition to Kansas and Missouri, DUFB is also present

in Oregon, Idaho, California, Nevada, Utah, Arizona, Wyoming, Colorado, New Mexico, Nebraska, Oklahoma, Texas, Hawaii, Iowa, Arkansas, Alabama, Michigan, Ohio, North Carolina, New York, and New Hampshire (74).

While this program is still relatively new and there is currently a limited number of publications, Savoie-Roskos found that within a population of DUFB participants at a Utah farmers' market, fewer individuals reported food insecurity-related behaviors and there were significant increases in the reported intake of some vegetables (86).

Issues of Access

Within the Kansas City metropolitan area, many of the large chain grocery stores such as Price Chopper, Walmart, and Save-A-Lot are approved to participate in SNAP and WIC, however the vast majority of non-chain stores are not WIC authorized. Some larger locally owned stores such as Bonito Michoacan in downtown Kansas City, KS are able to meet the majority of qualifications but not all, limiting accessibility for mothers that live in that area of town, particularly those that are exclusively Spanish-speaking.

In examining the demographic data collected from county rankings and Behavioral Risk Factor Surveillance System (BRFSS) data (Appendix A,B,C), the counties of Wyandotte, Kansas (containing downtown Kansas City, KS) and St. Louis City County, MO (containing downtown St. Louis, MO) consistently are ranked among the least healthy in a multitude of areas including perceived health status, fruit and vegetable intake, and quality of life. Factors of note within these counties are the high percentage of minority status individuals within their populations and the relative level of food insecurity, prevalence of obesity, and general disparities among self-reported health (4, 9, 10, 78-80).

Food insecurity is most commonly seen in the United States among the elderly and disabled, immigrants, Latinos, and African Americans. Among those who are food insecure, the vast majority are low-income, with higher prevalence among families headed by single women, African Americans, and Hispanics (44). In New York City and its surrounding areas, the density of stores also reflected the ethnic makeup and income status of neighborhoods, with more supermarkets present in predominantly white, affluent areas such as southern Manhattan than in primarily Black and Latino, lower-income neighborhoods such as northern Manhattan and the South Bronx (85). Especially in the case of urban areas like New York City, retailers run into issues that will limit their ability to build stores. Pthukuchi describes this as the "*urban disadvantage*", noting cramped space, old infrastructure, limited parking, and poor access to highways for distribution as key limiting factors (44). This can have further detrimental effect on inner city areas, preventing many retailers from starting new shops that would provide fresh produce and a variety of healthy options for the people living in inner-city neighborhoods.

Safety is also a primary concern for many people when attempting to access food. Accounting for high crime rates further reduces the level of accessibility, especially in the case of lower income neighborhoods and those with higher proportions of black, Hispanic, and Asian residents (18).

The issue of walkability is of particular concern among urban environments. When defining areas as food deserts, a general standard is consideration of the distance that can be reasonably walked in the span of ten minutes. This typically equates to approximately a distance of 0.62 miles in a 10-15 minute span, while an individual driving in a car could be expected to travel 3 miles or more in the same amount of time (18). In the case of those who are walking, and especially those that are elderly or have disabilities, carrying groceries for greater than 10

minutes could constitute an obstacle that cannot be overcome. Heavier and bulkier objects need to be considered for the sake of transport, and the person may need to either make multiple trips to the store to accommodate the load or may eliminate the item from their list (44).

When examining populated areas such as Saskatoon (59) and London, Ontario (18), the ability to walk to healthy food sources has proven impact on health status of residents. In Saskatoon, the average distance to unhealthy food sources is 500-800 m from home; the nearest grocery store is 1381 m while the nearest convenience stores and fast food restaurants average 803 m and 1236 m, respectively (59). Even in the most urbanized parts of London, Ontario, only 35.1% of residents live within 1 km of a grocery store (18). However, 86.5% of grocery stores are accessible via bus (18).

Within King County, Washington, Jiao et al. found that 29% of the county's vulnerable population lived outside of a 1 mile range from a supermarket, with 78% of the total population living more than a 10 minute walk away from supermarkets (48).

Food environment, particularly access to food venues, has been found through a variety of studies to play a large role in diet and obesity rates by influencing the types of stores that consumers shop in and therefore the foods that they buy (45) (58) (16) (22) (25) (26) (50) (95) (57). Even if supermarkets are available, a number of studies have also found that SNAP participants tend to do the majority of their shopping at gas stations, convenience stores, and mid-size grocers (45) (51) (67) (88).

Gustafson et al. found that SNAP households shopped at a supermarket within 1 mile of their home rather than a more distant supercenter, but a supercenter within 1 mile was preferred to a supermarket (45).

Time of day is also an important factor that must be considered, particularly when dealing with people who work night shifts or are not able to shop during normal business hours (94). Lower income populations tend to make more use of public transit for their day to day needs, but public transit reliability varies due to traffic and availability (94).

When considering method of travel, it is important to consider that personal vehicles are not always the mode of choice. Crabtree and Mushi-Brunt, in examining the 16,114 participants who completed the 1994 National Health Interview Survey for the Disability Phase II Adult Public Use file, noted nearly 29% of participants indicated that they never drove a car or other motor vehicle (31). Jiao et.al. found that within Washington, the three highest determinants of whether an individual drove a car for shopping needs were whether the person lived in a single family household, how many adults lived within the household, and the number of cars per adult (48). Distance between household, work, and grocery store also impacted whether people were likely to drive (48).

Lack of access to a car has been associated with lower income and minority status. The 2003 to 2007 American Time Use Survey reflected concentrated areas of poverty within populous areas such as Detroit, Chicago and New Orleans (52). In New York City in the year 2000, white residents tended to have highest rates of private vehicle ownership while Hispanic residents had the lowest (18). As Crabtree and Mushi-Brunt reported in their study, people whom were "*transportation disadvantaged*" were nine times more likely to experience difficulty when shopping for groceries (31).

In the case of rural communities, the standard for food desert classification is different than that of urban environments (52). Distances for urban areas typically range between 0.8 km to 2.5 km, while rural areas can range for distances of up to ten miles to accommodate for greater

distances between communities (52). This is reflected in transportation method, as is demonstrated by Klementschitz's study in Vienna with nearly all shoppers in rural locations choosing to drive a car (56). He also notes that while transport mode varied from location to location, public transportation does not play a role in rural transport (56).

Diet Quality

Diet quality is a key contributor to weight and risk for developing a multitude of disease states. According to the United States Department of Agriculture's Dietary Guidelines for Americans 2015-2020, the daily consumption of the average American should consist of:

- "An appropriate calorie level to help achieve and maintain a healthy body weight, support nutrient adequacy, and reduce the risk of chronic disease" (14)
- 2.5 cups of a variety of vegetables including dark green, red and orange, legumes, starchy, and other
- 2 cups fruits, especially whole fruit
- 6 oz grains, at least half of which are whole grains rather than refined
- 3 cups fat-free or low-fat dairy and/or fortified soy beverages
- 5.5 oz protein foods
- 27 g oils

The USDA also recommends that added sugars and saturated fats should each consist of less than 10% of calories consumed each day and that sodium should be restricted to 2300 mg (14).

Costs for Diet Adherence

The recommended intakes for Americans can be difficult to meet, particularly among low-income populations. The USDA calculated in 2011 that the average family of 4 (consisting of 2 adults aged 20-50 and 2 children aged 6-8 and 9-11 years) would pay approximately $147/week ($588/month for a family of 4) to adhere to these recommendations, with fruit and vegetable recommendations costing between $2.10-$2.60 per day per household (73) (8) (92). Mulik, however, found that a family of 4 ranged from $1,249/month to $903/month depending on the age of family members and projected diet and buying practices (73). They also found that additional individual costs would factor in for age and gender of various family members, with boys aged 12-17 years requiring an extra $75/month to account for growth needs and increased consumption and men aged 18-50 years requiring $72/month (73). Similarly, when taking into account the time and relative cost of preparing a meal at home, Mulik found that current SNAP benefits and expected personal expenditures would not be sufficient to support the MyPlate-recommended diet (73).

Disparities in Diet Quality

Multiple factors impact an individual's diet quality, ranging from personal preference to access to foods. Cost is a major hindrance to many people; even if the shopper lives within close proximity of an expensive, high-end grocery store, they may not be able to shop there due to limited funds (31). Crabtree and Mushi- Brunt found that when accounting for the difference between high and low-cost supermarkets when examining grocery access for low-income individuals, greater than 89% lived outside of reasonable walking distance to a supermarket in their price range (31). In the case of children in Saskatoon, Canada those who lived within

walking distance of healthy food sources reflected a lower body mass index (BMI), with lower cost of healthy foods having a bigger impact on weight status than the specific types of food consumed, age, sex, or socioeconomic status (59).

When looking at socioeconomic status, multiple studies have found that individuals of low-income status and those with limited resources are less likely to adhere to the Dietary Guidelines for Americans, with the diets tending to be overall less nutritious and balanced (73) (47) (55) (86) (29) (54) (69). In particular, lower income households tend to consume fewer fruits, vegetables, and fiber while consuming greater proportions of energy from fat as well as being more likely to patronize fast food restaurants rather than full-service restaurants when eating out (39) (24) (91) (34).

Examining SNAP recipients in particular, Andreyeva et al. found that those who utilize SNAP tended not to have statistically significant differences in energy intakes when compared to non-participants, with general intakes in the recommended range (17). However, overall dietary quality was poorer in low-income study participants than higher-income participants; there were higher levels of sugar-sweetened beverage consumption, higher intake of high-fat dairy, lower fiber and vitamin C intake among children, and overall lower intake of numerous vitamins and nutrients including vitamin C, calcium, fiber, and sodium (17). SNAP participants were also less likely to consume three meals per day than their higher-income counterparts and were more likely to prioritize beef and frozen foods over other foods, with diminished spending on fruits and vegetables (17).

These findings are supported by a number of other studies, with SNAP participants found to be significantly less likely to meet the recommendations set by the Dietary Guidelines for Americans; participants were found to have increased consumption of meats, added sugars, and

total fats without an effect on fruit, vegetable, grain, or dairy product consumption (73) (37) (41). Leung also found that SNAP participants tended to consume higher amounts of fruit juices, potatoes, red meats, and sugar-sweetened beverages with lower consumption of whole grains (60). French et al. found that lower income households spent significantly fewer dollars on fruits and vegetables as well as sweets/snacks but did not differ with respect to sugar-sweetened beverages, however the proportion of beverages consumed that were sugar-sweetened were higher among low-income individuals (39).

Nguyen et al. further found that *"participants in SNAP had statistically significant lower scores for the following: total vegetables, total fruits, whole fruits, seafood and plant protein, and empty calories. Nevertheless, compared with SNAP income-eligible nonparticipants, SNAP participants had comparable scores on greens and beans, whole grains, refined grains, total dairy, total proteins, fatty acids, and sodium intake. In addition, SNAP participants had a higher percentage of intake of empty calories of total calories, which may result from a higher intake of added sugar rather than intake of solid fats"* (76).

Grummon et al. found that households had low mean purchases of fruit, vegetables, and fiber along with high mean purchases of junk foods, saturated fat, and sodium regardless of SNAP status, with non-participating households purchasing overall higher levels of healthful foods than those that participated in SNAP (43). Higher-income non-participants were found to have purchased slightly more calories from non-starchy vegetables than their SNAP counterparts, however they also purchased slightly fewer calories from starchy vegetables. There was no significant difference between groups in regards to total vegetables, legumes, nuts, other dairy, desserts and sweet snacks, candy and gum, or junk foods. Income-eligible and higher-

income non-participants purchased significantly fewer calories from sugar sweetened beverages than the SNAP participants (43).

In a USDA analysis of buying practices among SNAP households, Garasky et al. found that while households tended to display relatively similar buying practices overall, regardless of SNAP participation, SNAP households showed differing preferences among the top purchasing categories (40) (*see Appendix D*). In breaking down the expenditure patterns, they also found that approximately 40 cents of every dollar were spent on items such as meat, fruits, vegetables, milk, eggs, and bread. Approximately 20 cents were spent on sweetened beverages, desserts, salty snacks, candy and sugar. The remaining 40 cents were spent on miscellaneous other foodstuffs.

Disease State Prevalence Rates

Cardiovascular disease (CVD) is a common and deadly health issue among Americans; approximately 1 in 4 deaths are due to heart disease accounting for 800,000 deaths and 6 million hospital admissions annually, with 370,000 deaths occurring annually due to coronary heart disease (81, 83) (84). CVD is indiscriminate of gender and is the leading cause of death in both men and women (83). Conditions that increase a person's risk of developing CVD include high blood pressure, high cholesterol, smoking, diabetes, overweight/obesity, poor diet, physical inactivity, and excessive alcohol use (83). Additional factors that play a role in CVD development are rooted in a person's food environment, or the density and type of food sources available (66).

Modifiable risk factors that contribute heavily to CVD include low levels of fruit and vegetable consumption and high intake of sugar-sweetened beverages. These eating patterns are particularly common among groups of low socioeconomic status, highlighting the importance of

focused marketing efforts (81) (5) (62) (72) (90) (7). Studies examining fiscal strategies for marketing efforts to reduce CVD found that utilizing a national 10% fruit and vegetable subsidy with a 30% fruit and vegetable subsidy targeting SNAP participants would have a significant impact on both mortality and socio-economic disparities (81).

Obesity is another widespread health issue that Americans are growing more and more accustomed to as levels continue to rise. Over the last 50 years, the numbers of overweight and obese adults has more than doubled (33). As of the 2009-2010 National Health and Nutrition Examination Survey (NHANES), more than 2 in 3 adults are considered to be overweight or obese with more than 1 in 3 adults considered obese while approximately one-third of children and adolescents ages 6 to 19 are considered to be overweight or obese (33). Beyond being an undesirable disease state on its own, excessive weight is also linked to numerous other conditions including type 2 diabetes, heart disease, hypertension, non-alcoholic fatty liver disease, osteoarthritis, cancer, and stroke (33). In a study examining NHANES data from 12 states, Pan et al. found that the prevalence of overweight and obesity was significantly higher among food insecure adults in comparison to adults who were not (35.1% vs 25.2%; $p<0.001$). This was seen particularly in those who were above the age of 30; females; non-Hispanic whites, non-Hispanic blacks, non-Hispanic other races; adults with at least some college education; people with reported household income below $25,000 or in the range of $50,000 - $74,900; employed or retired adults, students, and homemakers; adults with either no children or two children in their households (77).

Diabetes mellitus, particularly type 2, is commonly associated with both CVD and obesity and has proven to be problematic for Americans, not only in terms of health but also in terms of expense (82). People with diabetes are at higher risk of developing blindness, kidney

failure, heart disease, stroke, and loss of toes, feet or legs due to neuropathy and poor wound healing (82). Medical costs for people with diabetes are twice those of people without diabetes, and care for individuals with diabetes amounts to $245 billion between the medical costs and lost wages (82). 29.1 million people in the United States have diabetes, with approximately 8.1 million people going undiagnosed (82).

Another area of particular concern among food-insecure individuals is mental health. Particularly in examining youth, food insecurity is associated with poor academic performance, school behavioral difficulties, increased risk for high BMI, decreased physical activity, increased odds of mood, anxiety, behavior and substance disorders, and decreased health care access. (19) (15) (28) (95) (68) (64). Baer et al. found in their study of urban youth that younger participants (ages 15-17) were more likely to identify as having low food security and older participants (ages 18-25) were more likely to identify as having very low food security and that as the level of food security decreased, the total number of health-related social problems increased, specifically in the areas of education, health care access, income insecurity, and substance use (19).

Nutrition and Chronic Disease

Each of these disease states can be directly linked to nutrition, particularly in regard to high BMI. Overweight and obese status are generally the result of excess energy storage in the form of fat due to overconsumption of calories and is typically associated with an overall unhealthy diet. This can manifest in the form of weight gain, high fat and sugar intake, and a lack of essential nutrients. Particularly in the case of food security, individuals experience an increased risk of undernutrition, overnutrition, obesity, micronutrient deficiencies, and

complications of other diet-related health issues (44). All of these factors contribute to the previously stated diseases. Rundle et al. found that food environment plays a part in maintenance of a lower BMI, with higher concentrations of healthy food retailers contributing to a lower mean BMI as well as lower prevalence of overweight and obesity (85).

Conclusion

Food access is an important component of a healthy lifestyle, with distance to grocery stores, types of foods available, and relative funds playing a significant role in an individual's ability to purchase healthy foods. Disparities exist among people of lower socioeconomic and of minority status. Programs such as SNAP, WIC, and Double Up Food Bucks have been enacted to counter some of these disparities and have seen notable success. However in the case of SNAP where there is minimal restriction on foods that may be purchased, participants tend to make less healthy purchases than their non-SNAP counterparts. Additional research would be beneficial to determine how effectively these programs are utilized, particularly in the interest of examining whether incentive-based healthy purchasing programs such as HIP and DUFB have an impact on health status of the SNAP participants that utilize them.

Chapter 3: Methods

Overview

The purpose of this secondary analysis is to look specifically at Double Up Food Bucks participants in the context of food security and perceived health status to determine if there is a potential association with ranked importance of fruits and vegetables. In order to be included in the study, participants were required to be 18 years of age or older, enrolled in SNAP, and could only be surveyed once. Participants were recruited through convenience sampling at farmers' markets and grocery stores in three geographic regions: Eastern Kansas, Kansas City, and St. Louis.

Setting

The surveys that have been examined over the course of this secondary analysis were collected during the growing seasons of July – October of 2016 and June – September of 2017. Student surveyors and research coordinators were sent to farmers' markets and grocery stores in Eastern Kansas, Kansas City, and St. Louis. A full list of locations surveyed has been provided in Appendix E.

Ethics

This project is covered under an existing protocol approved by the Human Subjects Committee and therefore did not require additional committee approval. As it is a secondary analysis of a study conducted using a convenience sample of subjects, of which no identifiable data was collected, the research qualifies for exempt status and consent forms were not required.

Procedures

Once at their respective location, surveyors read the questionnaire to a convenience sample of participants and filled in their responses. The only inclusion criteria for participants were that they were required to be receiving SNAP benefits (and therefore eligible for DUFB), over the age of 18, had not been previously surveyed for the study, and were able to communicate in a common language with surveyors to allow for survey interpretation. The completed surveys were then returned and the data were double checked for accuracy and input into a database for aggregation. Surveyors were provided with hard copy surveys and reusable bags that served as participant incentives; reusable grocery bags were given to participants that were surveyed at grocery stores and burlap token bags were given to participants that were surveyed at farmers' markets.

Materials

The data were collected via the Double Up Food Bucks Customer Surveys from 2016 and 2017 (provided in Appendix F, G). Specifically, this project focused on answers to the following survey questions:

- How important do you think eating fruits and vegetables is to your health?
- Would you say that in *general* your health is:
- How many servings of *fruit* do you usually eat or drink each day?
- How many servings of *vegetables* do you usually eat or drink in a day?
- Within the past 12 months, did you ever *worry* whether your food would run out before you got money to buy more?

- Within the past 12 months, did the food you buy ever *just not last* and you didn't have money to get more?
- In what type of store do you typically shop for fruits and vegetables?
- How do you typically travel to the market or store? (2017 only)
- How important is it to you that the fruits and vegetables you purchase are locally grown?

These questions address perceived importance of fruit and vegetable consumption, self-report of health, presence of food insecurity, method of access to food sources, and importance of locally sourced produce within the surveyed population. The questions regarding food insecurity are derived from the United States Department of Agriculture Food Security Survey Module and have been independently validated (13, 71).

Analysis of Data

Means, medians, frequencies, standard errors, min and max values, and/or quartiles were calculated to summarize the collected data in figures and tables. The non-parametric Mann-Whitney U test was used for comparisons between non DUFB and DUFB users and to confirm that fruit and vegetable intake of DUFB users did not differ between the 2016 and 2017 years of sampling. Pearson correlation analysis or linear mixed effects modeling were employed to screen for significant correlations between two or more responses of DUFB participants. Comparison of selected importance of fruits and vegetables to health against reported daily servings of fruits and vegetables was unable to be carried out through statistical means due to 139 out of 142 respondents indicating that fruits and vegetables are very important for health.

Self-reported general health as a function of daily servings of fruits and vegetables was analyzed via a multinomial logistical model to assess all intake utilizing the middle ordinal value

"good" general health as a reference point. Food insecurity, defined in this study as an affirmative response to either of the questions regarding concern about food running out or being unable to purchase additional food at any point in the past 12 months was incorporated as an additional factor in the analysis for consideration. Chi-squared analysis was utilized to test independence of food intake and perceived health, with food intake categorized nominally into 'recommended' versus 'below recommended' categories based on adherence to recommendations from the 2015-2020 Dietary Guidelines for Americans. Comparison of reported fruit and vegetable intake against food security status was completed via linear regression, Chi-squared, and odds ratio analyses.

Method of transportation was compared against the store type that shoppers typically patronize to purchase fruits and vegetables utilizing Fisher's Exact tests of independence and proportions tables. A proportion table (Table 5) and Fisher Exact test were also utilized to compare store type against perceived importance of purchasing produce locally. All statistical tests were carried out with R Statistical Software version 3.4.4 augmented with installation of statistics packages lme4 version 1.1-17 for linear mixed effects regression and nnet version 7.3-12 for multinomial logistical regression.

Chapter 4: Results

Survey data were collected on 106 respondents in 2016 and 143 in 2017, of which 73 utilized Double Up Food Bucks (DUFB) in 2016 and 75 utilized DUFB in 2017. The average age of the participants was 47 years and there was no statistical difference between respondents that utilized DUFB and those whom did not utilize DUFB with respect to age (47.1 ± 1.25 years, n=146 vs 44.9± 1.50 years, n=100, p=0.84). A similar test of racial distribution data collected during the 2017 cycle did not show statistically significant differences between those who use DUFB and those who did not use DUFB, though data were trending towards a difference (p=0.0581). See Figure 1 for distribution of survey responses.

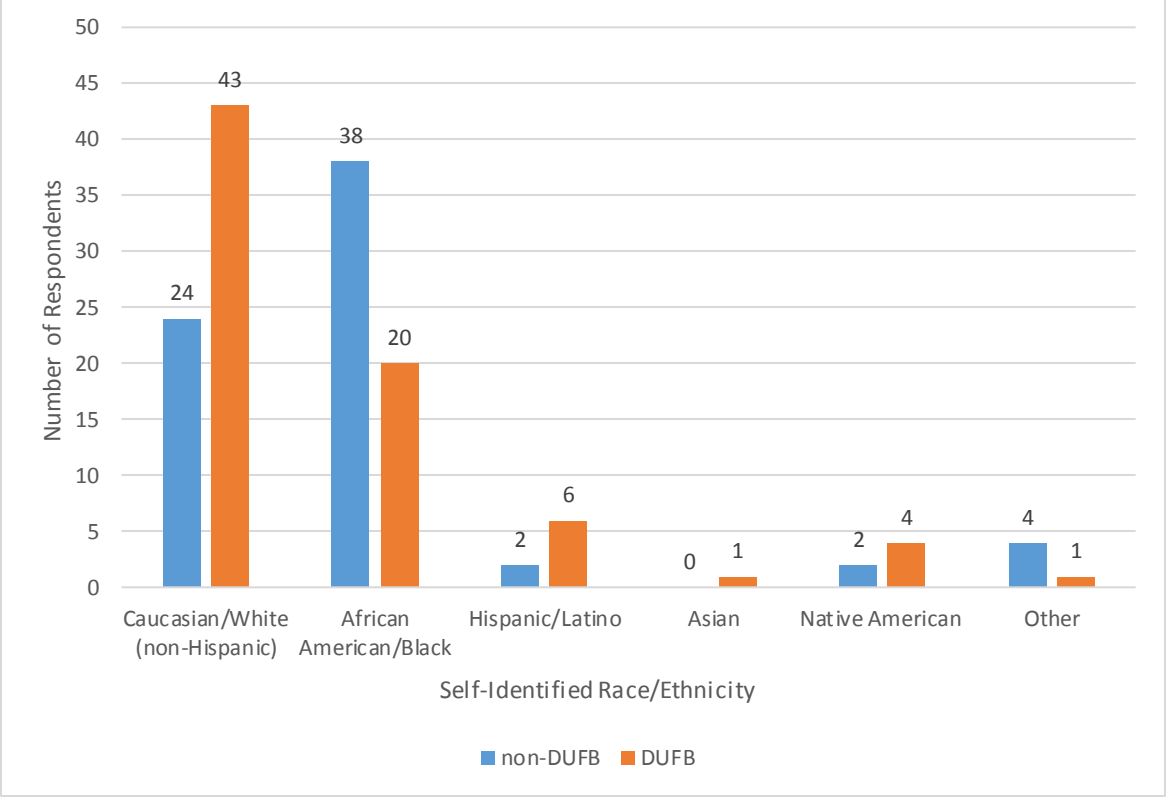
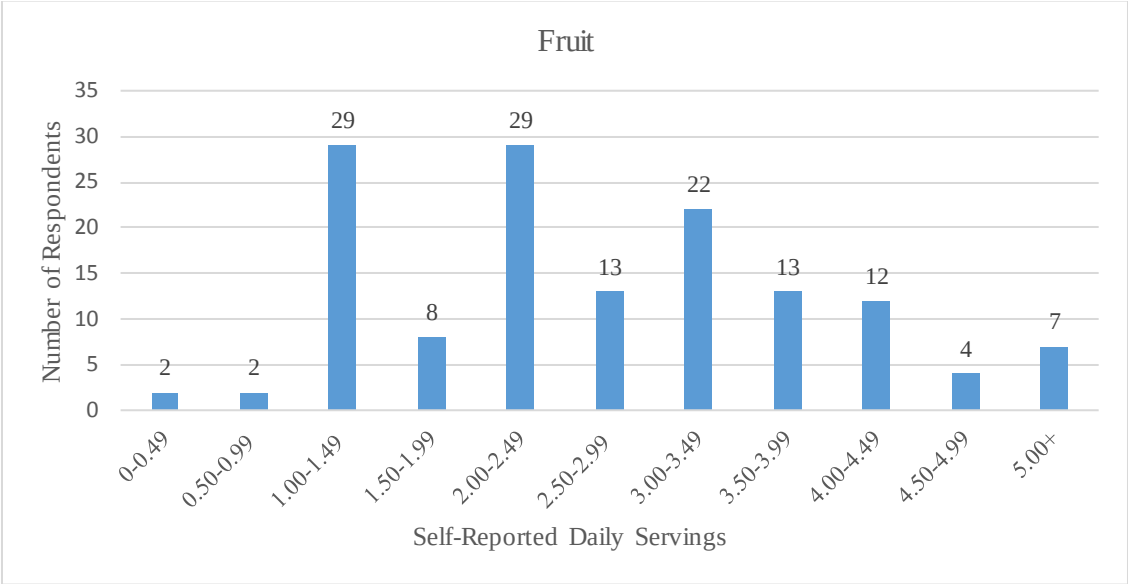


Figure 1. Self-identified racial distribution of non-DUFB and DUFB users in the 2017 surveys.

All but 3 individuals surveyed over the two years felt that fruit and vegetable intake was very important to health; the remaining three considered it slightly important. Despite that, the daily intake of fruits and vegetables varied considerably among participants, ranging from 0-8 fruit servings and 0.5-20 vegetable servings per day with a mean of 2.49 ± 0.12 fruit and 2.86 ± 0.096 vegetable servings. Summarizing these data as shown in Fig. 3 gives median values of 2 and 2.5 servings per day for fruit and 2.75 and 2.5 servings per day for vegetables in 2016 and 2017 respectively, and confirmed that there were no statistical differences between these data collected during the two years. The larger range of vegetable intake in 2017 is due to a single study participant who indicated a purposefully large intake of vegetables of ~20 servings per day. Statistical analysis was conducted with the inclusion of this outlier in the data pool.

A.



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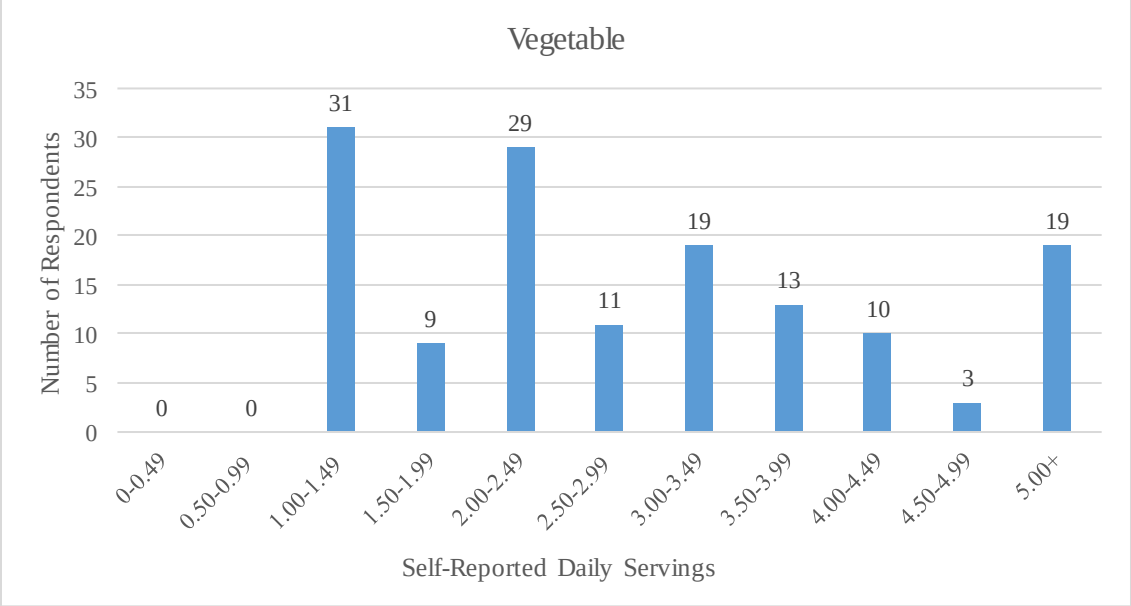


Figure 2. Histograms showing 2016 & 2017 combined reported daily servings of fruit (A.) and vegetables (B.) of DUFB users.

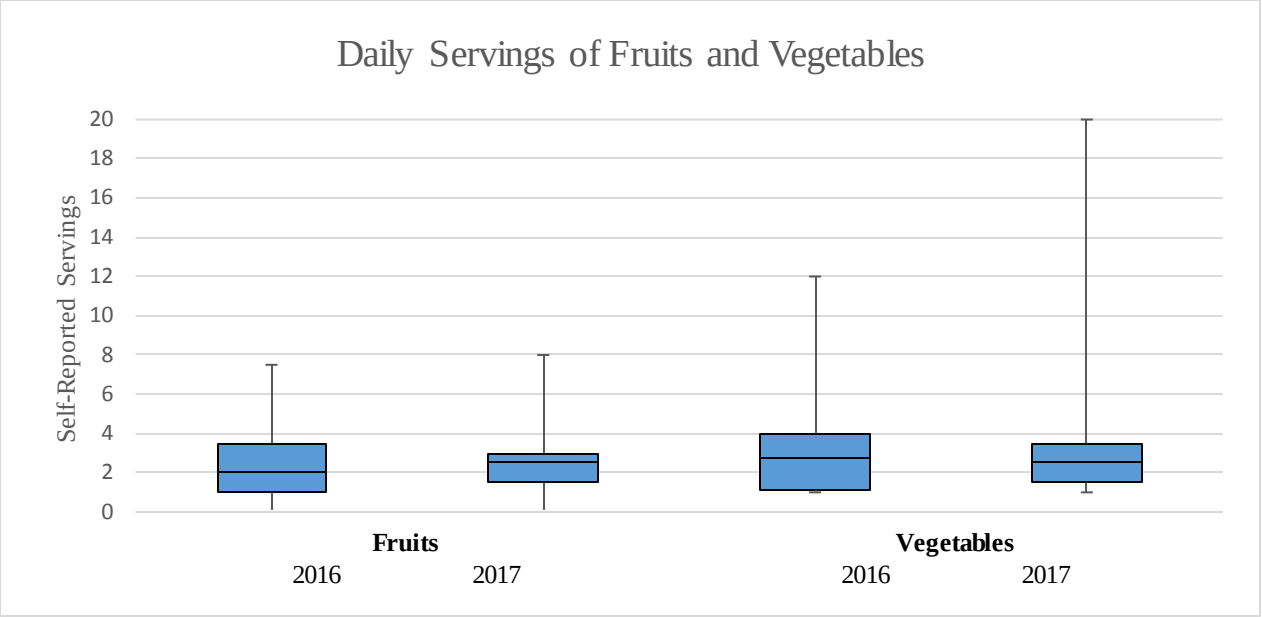


Figure 3. Whiskers graphs (bars = quartiles 2 & 3, horizontal line = median, vertical lines = min and max) summarizing daily servings data of fruit and vegetables during 2016 and 2017.

Table 1 depicts the intake of fruits and vegetables as categorized by perceived health status. There was a significant association between self-reported fruit intake and those who categorize their general health as being "Poor". No other variables reached this level of significance, but "Very good" health trended toward a reduced risk for being food insecure.

Table 1. Mean values of self-reported intake for each self-reported general health classification

Self-Reported General Health	Count	Daily Fruit ½ cup Servings	Daily Vegetable ½ cup Servings	Food Insecure Count & % of category**
Excellent	n=10 (6.8% of total)	2.5 ± 0.31	2.8 ± 0.62	n= 5 (50% of excellent)
Very good	n=29 (19.6% of total)	2.7 ± 0.26	3.4 ± 0.41	n= 15 (51.7% of very good)
Good	n= 63 (42.6% of total)	2.6 ± 0.19	2.7 ± 0.20	n = 45 (71.4% of good)
Fair	n=37 (25% of total)	2.5 ± 0.23	3.2 ± 0.58	n= 29 (78.4% of fair)
Poor	n = 9 (6.1% of total)	1.5 ± 0.17*	2.4 ± 0.48	n = 7 (77% of poor)

* $p < 0.05$, † $p < 0.1$.

****Participants designated as food insecure if they answered affirmatively to one or both security questions**

There was not sufficient evidence to conclude a relationship existed between reported health and whether or not respondents' reported intakes met recommended levels per the 2015-2020 Dietary Guidelines for Americans for fruit ($p= 0.620$) and vegetables ($p=0.804$).

Linear regression was conducted for insecure and very insecure groupings, however neither grouping yielded statistically significant relationships between food security status and intake for fruits (p-value = 0.650 and 0.837, respectively) or vegetables (p-value = 0.417 and 0.411, respectively). "Food insecure" was defined in this study as an affirmative answer to at least one food security question while "very insecure" was defined as answering affirmatively to both food insecurity questions. Categorization of intake based on meeting recommended levels was compared against food security status, yielding a p-value of 0.132, OR 0.499 for fruits and p-value 0.974, OR 0.983 for vegetables, indicating that intake of fruits and vegetables is independent of food security status.

As is evident in Figure 4, the vast majority of this sample bought their produce at supermarkets. Within both the DUFB sample as a whole and when specifically examining the food insecure population, most respondents indicated that they drove themselves to the store (Figure 5). A large majority of DUFB users drove to a supermarket (~74%) to purchase their fruits and vegetables with scattered use of alternative means of transportation or other types of stores as shown in Table 2. Consequently, examination of a possible relationship between method of transportation and store type utilized in this population resulted in an overall p-value of 0.214, indicating no statistically significant correlation exists.

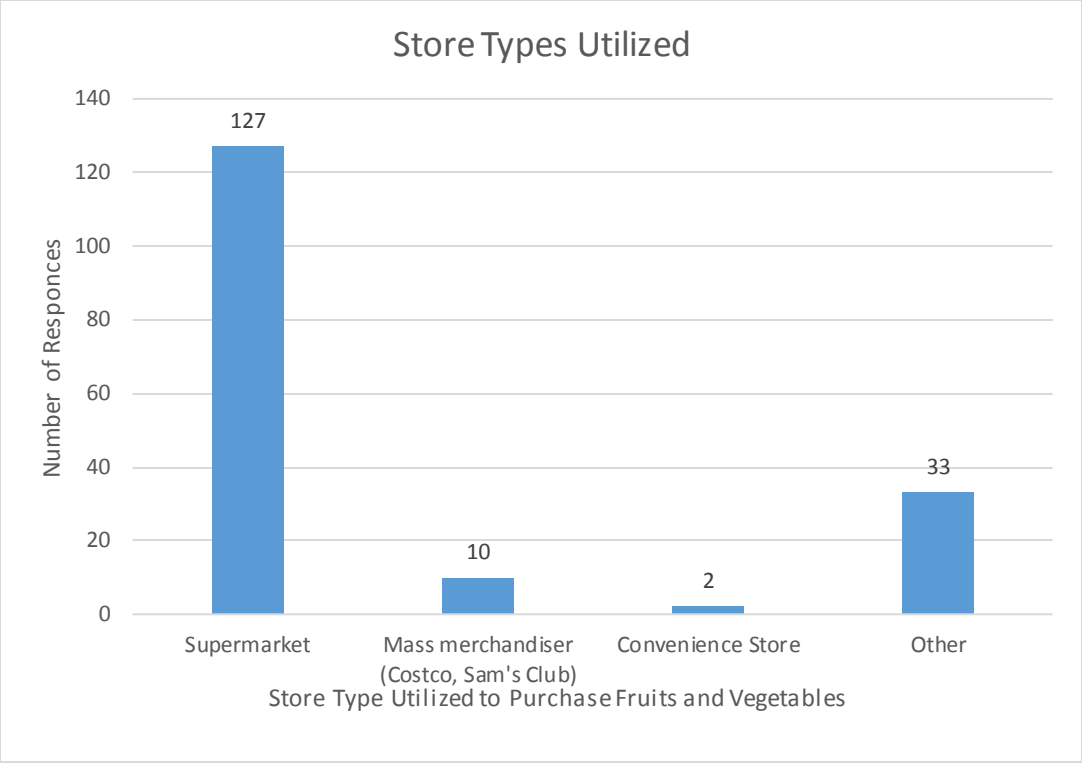
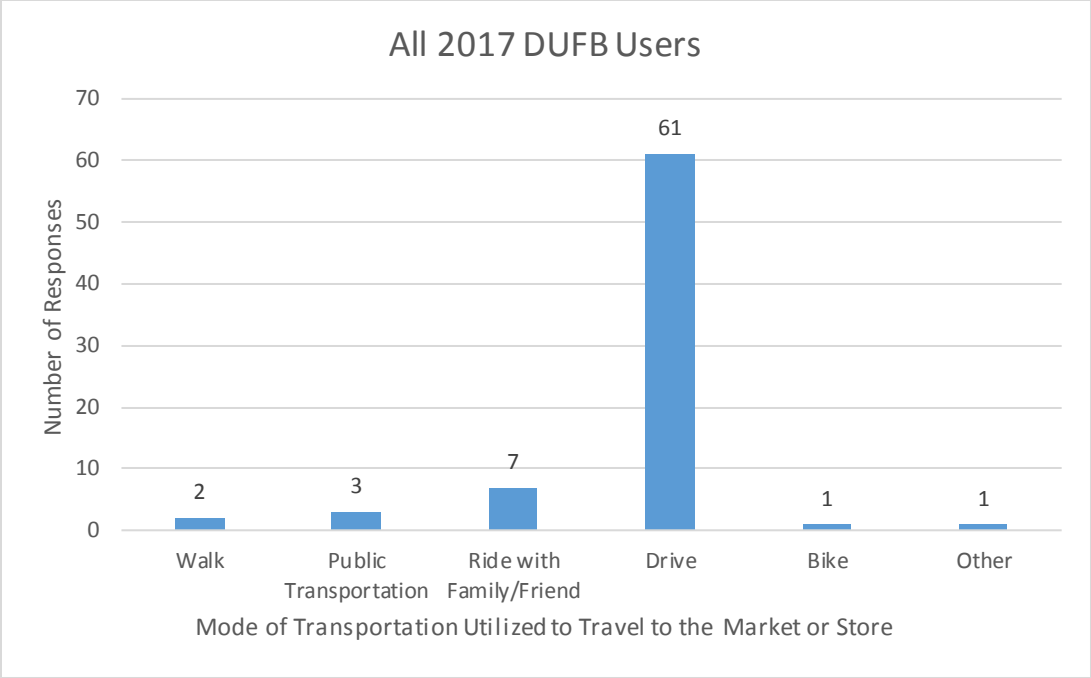


Figure 4. Histogram summarizing store type most commonly utilized for fruit and vegetable purchases. Some respondents (n=16) indicated more than one option.

A.



B.

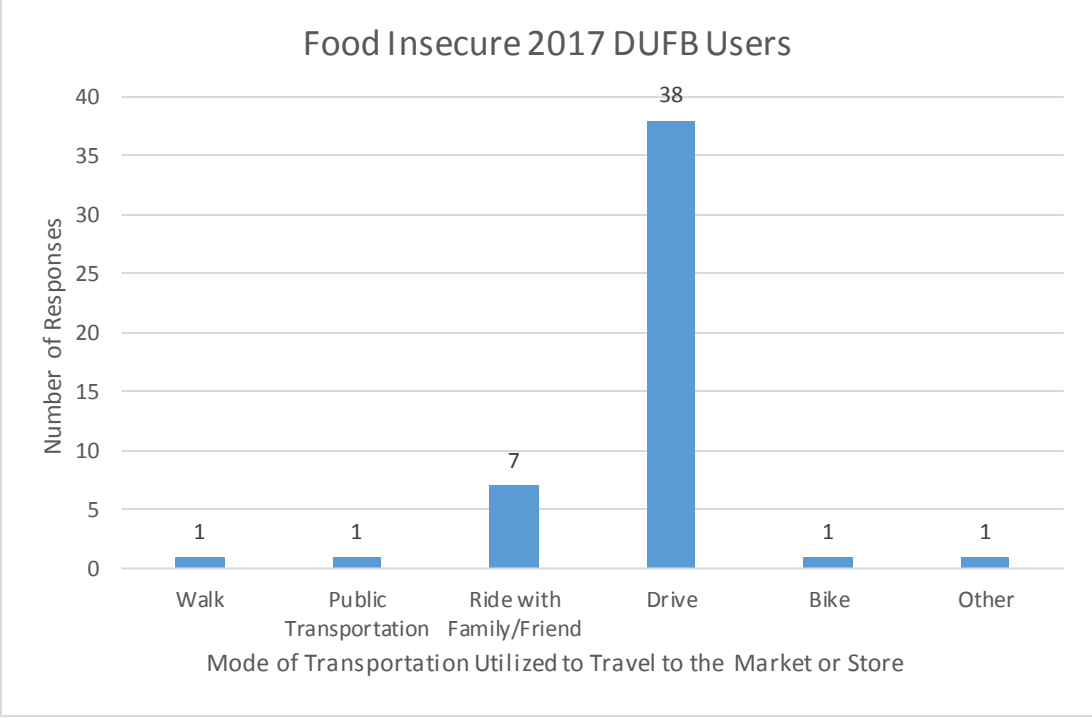


Figure 5. Histograms showing mode of transportation typically utilized to travel to the market or store for all 2017 DUFB users (A.) and food insecure DUFB users (B.)

Table 2. Percentage table showing mode of transportation utilized to reach store type patronized for the purchase of fruits and vegetables.

	Walk	Public Transport	Ride with friend/family	Drive	Bike	Other
Supermarket	3.1%	4.6%	6.2%	73.8%	1.5%	0
Mass Merchandiser	0	0	0	0	0	0
Convenience Store	0	0	0	0	0	0
Other	0	0	0	7.7%	0	1.5%

Table 3 further separates the respondents into their food secure or food insecure designations, illustrating the overall distribution of participants as they fell within these categories. The overall distribution pattern remained similar: the majority in both the secure and insecure categories drove their own cars and shopped predominantly at the supermarket.

Table 3. Percentage table distributing the results of Table 3 between the Food Secure and Food Insecure categories.

Food Secure n= 23	**Walk**	**Public Transport**	**Ride with friend/family**	**Drive**	**Bike**	**Other**
Supermarket	1.5%	3.1%	0	26.2%	0	0
Mass Merchandiser	0	0	0	0	0	0
Convenience Store	0	0	0	0	0	0
Other	0	0	0	4.6%	0	0
Food Insecure n=42	**Walk**	**Public Transport**	**Ride with friend/family**	**Drive**	**Bike**	**Other**
Supermarket	1.5%	1.5%	6.2%	47.7%	1.5%	0
Mass Merchandiser	0	0	0	0	0	0
Convenience Store	0	0	0	0	0	0
Other	0	0	1.5%	3.1%	0	1.5%

In regards to the perceived importance of purchasing locally grown produce, 121 respondents indicated that it was very important to them, while 21 indicated that it was slightly important and 5 indicated that it was not important (Figure 6). Comparing these results to the store types utilized, 70% of respondents indicated that purchasing locally grown produce was very important and purchased their produce at a supermarket (Table 4). A Fisher Exact test comparing the importance of purchasing locally sourced produce against store type patronized generated a p-value of 0.904, indicating that there is also no statistically significant relationship between the stores that this sample frequents and their perceived importance of purchasing locally sourced food.

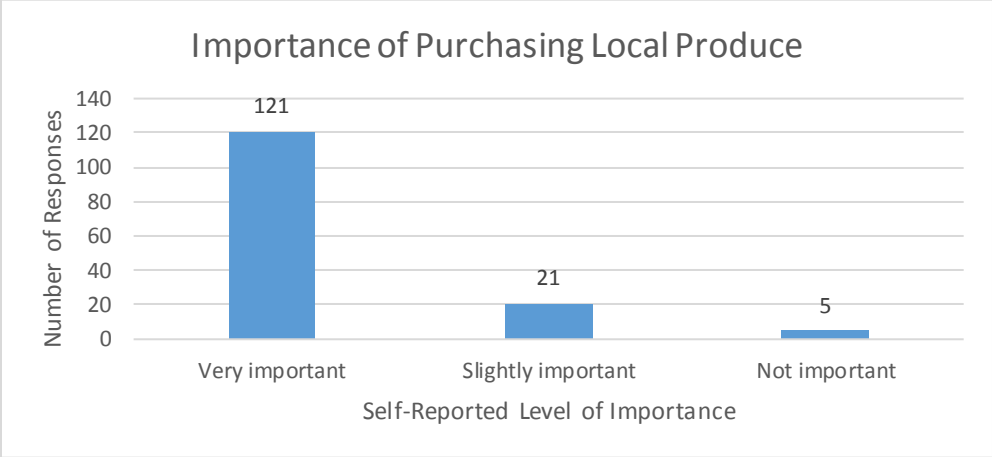


Figure 6. Histogram summarizing self-reported importance of purchasing locally grown produce.

Table 4. Importance of locally sourced produce and store type utilized for its purchase.

Total n = 131	Not important	Slightly Important	Very Important
Supermarket	3.8%	13%	70.2%
Mass Merchandiser	0	0	0.8%
Convenience Store	0	0	1.5%
Other	0	0.8%	9.9%

Chapter 5: Discussion

Out of a sample of 142 people, 139 indicated a belief that fruit and vegetable intake is very important for health. Despite this, there was a wide range of self-reported servings of fruit and vegetable intake even when examining security status and location of survey. These findings are consistent with Smith's study of low-income women in Glasgow, Scotland; 95% of study participants indicated an understanding of the importance of fruits and vegetables for health while only 39% reported daily consumption of fruits (53). The same can be said of Mienah et al.'s study of Latino women in two urban southern California neighborhoods in which the participants exhibited a general understanding of the importance of fruits and vegetables as part of a healthy diet (89). In both Smith and Mienah et al.'s studies, the subjects expressed the knowledge but a comparatively small percentage of participants put this knowledge into practice. One potential confounding factor in this Double Up Food Bucks study is the social approval bias connected to this knowledge. Miller et al. found in a study of 163 women in Colorado that participants given promotional materials centered around the 5-a-Day fruit and vegetable intake encouragement campaign reported higher average fruit and vegetable intakes than participants who were not given the materials, yet food frequency questionnaires and 24 hour recalls indicated actual intakes at statistically significant lower levels (70). Another potential confounder in both of these groups is a misunderstanding of what constitutes a serving. While the DUFB survey listed a serving as ½ cup of fruit or vegetable, it can be difficult for a participant to visualize accurately and can lead to a false report.

Mienah et al.'s study also found that the majority of their participants reported "good" eating habits, with a statistically significant association noted between "good" eating habits and overall health and fruit and vegetable consumption, yet many also reported high levels of soda

and energy-dense food consumption (89). Within the current Double Up Food Bucks study, the only statistically significant correlation was between diminished fruit intake and self-reported "poor" health, even when taking into account security status and comparing "good" and "bad" against "recommended" and "below recommended". This indicates that identifying as being in poor health is related to reporting eating significantly fewer servings of fruit. A subgroup analysis was conducted among DUFB participants whose surveys were collected at supermarkets (n=15), operating under the additional assumption that those who were shopping at the farmers markets were specifically seeking out fruits and vegetables while those who were surveyed at the supermarket were purchasing produce as only a portion of their shopping for the day. In the case of fruit consumption, Fisher's Exact tests yielded a p-value of 0.688 for the nominal vs. ordinal data and a p-value of 1 when comparing "good" and "bad" health against "recommended" and "below recommended" fruit intake values. This further indicates that there is no statistically significant relationship between fruit intake and perceived health within this sample, even when controlling for the survey site. Data could not be sufficiently analyzed for vegetable intake within this subgroup due to none of the self-reported vegetable intakes meeting the recommended levels established by the 2015-2020 Dietary Guidelines for Americans.

Regarding food security level and fruit and vegetable intake, studies such as Kendall et al.'s examination of women in New York State county have found evidence that there is an inverse correlation between food security status and the frequency of consumption of fruits and vegetables, with increased scores indicative of disordered eating to accommodate diminished availability as subjects identified as being increasingly food insecure (54). The data yielded by the current Double Up Food Bucks study did not support these findings; level of food security did not have a statistically significant relationship with fruit and vegetable intake among the

surveyed individuals. This could again be the result of social approval bias and misattribution of serving sizes confounding reports of intake. Another factor of note in examining the raw data is that some participants who answered affirmatively to both food security questions did not give specific numbers for intake, rather citing answers such as "depends" and "lots" in place of numbers of servings. Especially in the case of the participant who answered "depends", the amount of fruits and vegetables that they eat likely depends on what income they are able to allocate to foods and therefore could not provide an accurate estimate. For the sake of data analysis, these responses were not counted within intake as they did not provide numerical values and as such were assigned a 'not applicable' (N/A) designation in the R software.

While the data for this Double Up Food Bucks study did not yield statistically significant results with the exception of "poor" health relating to diminished fruit intake, comparing the data regarding fruit and vegetable intake for this population against national and SNAP-specific averages alludes to the effectiveness of the program. The average fruit consumption for this survey sample was higher at 2.49 ± 0.12 servings per day than the 2007-2010 national average of 1.05 cups and was comparable at 2.86 ± 0.096 servings per day to the national average of 1.42 cups (2). Similarly, in examining 2009 Behavioral Risk Factor Surveillance System data, Grimm et al. found that only 23.6% and 22.8% of respondents in the Kansas and Missouri low income category ate at least 2 fruits per day while only 22.6% of low income Kansans and 19.3% of low income Missourians consumed at least 3 vegetables, suggesting a greater level of intake among the participants in the current DUFB study when compared to their non-DUFB counterparts (42).

In regards to this analysis's secondary questions pertaining to store type utilized in relation to travel method and perceived importance of locally sourced produce, neither yielded statistically significant results. Shannon found in their study of SNAP-utilizing adults in the

Minneapolis-St. Paul area that low-income individuals will often travel outside of the range of their neighborhood in order to purchase food irrespective of supermarket representation with the majority spending their SNAP dollars at convenience stores and mid-sized grocers (88). Data from the current DUFB study indicated that the majority of participants shopped at supermarkets, however this could be due in part to various factors. The first of which is the options that are made available on the survey. Those shoppers who more frequently patronize mid-sized grocers such as ethnic markets and corner stores may have selected the Supermarket option as it was the closest approximation to their usual stores. Another factor that could have influenced these outcomes is the survey location. Since locations were limited to grocery stores and farmers markets, it is possible that the convenience sample generated missed a substantial population that frequents smaller establishments.

The perceived importance of locally sourced produce did not have a statistically significant impact on store types that the surveyed sample patronized. This finding is supported by Zepeda and Li's study, *Who Buys Local Food?* in which the researchers found that with exception of the highest ten percent of income level surveyed, consumer income was not a limiting factor in regards to buying practices for local foods (63). A factor of note is that the supermarkets that were targeted by the surveying sample plan for this Double Up Food Bucks study were selected because they carried fruits and vegetables from local vendors that were eligible for the DUFB matching. As such, further examination and more targeted surveying would be required to more adequately determine motives behind grocery purchases within the local category and to what extent the purchases are due to the incentive program as opposed to the desire to specifically seek out locally sourced goods.

Implications

These data will help to contribute to the research involving incentive-based buying programs for low-income Americans who rely on SNAP. Due to the inclusive nature of foods that can be purchased using SNAP dollars, it is important to encourage people who are utilizing the program to buy healthy foods. The data that has been examined over the course of this analysis gives better insight into the perceived health of those who are on this program and the potential relationship that their view of health has with their buying practices. Similarly, it allows for a greater insight into the types of food sources that this population frequents and the ease with which they are able to access them as well as providing direction for potential areas of further investigation such as underlying motivations for purchasing locally sourced goods.

Limitations

There are a number of limitations that could have impacted the study. First and foremost is use of the convenience sample for participants. Despite many attempts by surveyors, a limited number of questionnaires were able to be completed. This could be due to multiple factors that could include visibility of surveyor within the location, differences in spoken language, potential stigma of participating in SNAP-based research in a public place, and possible discrepancies between survey sites and sites of most frequent purchasing on the part of the target population. As a result, the data pool is not as large as the research team had initially hoped to accumulate. There is also the matter of selection bias in regards to the people that participated in the survey: surveyors were only able to interact with people that were shopping at those locations being surveyed and data were only collected for those people who elected to complete the survey.

Similarly, by examining only those participants that utilized DUFB, the data were more likely to be skewed in favor of fruit and vegetable consumption as those who would seek out the program are inherently more likely to be purchasing produce. Another limitation is that the questions regarding race/ethnicity and mode of transportation were added to the 2017 questionnaire and were not present on the 2016 questionnaire, resulting in a smaller than desired data pool. In addition, responses to the questions regarding intake and store type could have been impacted by misattribution of their usual habits.

Conclusion

While the overwhelming majority of study participants expressed a belief that fruit and vegetable intake is important to health, the range of self-reported intakes suggest that this belief does not have an impact on eating practices within this population. Even when accounting for factors such as food security status, dietary guideline recommendations, and survey location, servings of fruits and vegetables also did not have a statistically significant impact on self-reported health, with the exception of "poor" health correlating with diminished fruit intake. Food security status did not have a statistically significant impact on this sample's reported fruit and vegetable servings, however the reported intake among the DUFB survey population was higher than the 2007-2010 national average for fruit consumption, comparable to the 2007-2010 national average for vegetable consumption, and likely higher than SNAP-eligible non-DUFB counterparts. Furthermore, the stores that this sample choose to patronize for their produce appear to be independent of the shopper's travel method or perceived importance of purchasing local fruits and vegetables, with most participants choosing to shop at supermarkets and driving themselves to the store.

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Appendix A: Kansas and Missouri Demographics

Kansas and Missouri Demographics, 2017 (9, 10)	Douglas County, KS (Lawrence)	Wyandotte County, KS (Kansas City)	Johnson County, KS (Kansas City)	Jackson County, MO (Kansas City)	Clay County, MO (Kansas City)	St. Louis City County, MO (St. Louis)
Total Population	118,053	163,369	580,159	687,623	235,637	315,685
Gender:						
Male %	50.0%	49.6%	49.0%	48.4%	49.0%	48.4%
Female %	50.0%	50.4%	51.0%	51.6%	51.0%	51.6%
Age:						
≤18 years %	18.9%	28.1%	25.1%	24.0%	24.8%	20.1%
≥65 years %	10.8%	11.4%	13.1%	13.8%	13.1%	11.6%
Race:						
Non-Hispanic African American	4.3%	23.2%	4.8%	23.4%	6.0%	46.5%
American Indian and Alaskan Native	2.8%	1.3%	0.4%	0.6%	0.6%	0.3%
Asian	4.8%	4.1%	4.8%	1.9%	2.4%	3.3%
Native Hawaiian/ Other Pacific Islander	0.1%	0.2%	0.0%	0.3%	0.3%	0.0%
Hispanic	6.0%	27.7%	7.4%	8.9%	6.7%	3.9%
Non-Hispanic White	79.2%	42.1%	80.5%	62.6%	82.0%	44.0%
Diabetic %	7%	12%	8%	11%	10%	14%
Adult Obese %	24%	36%	25%	31%	29%	34%
Fair/Poor Health %	12%	22%	9%	18%	14%	22%
Physically Unhealthy Days	3.0	3.9	2.2	4.2	3.5	5.0
Mentally Unhealthy Days	3.2	3.7	2.7	4.2	3.8	4.7
Food Insecure %	17%	18%	12%	19%	13%	27%
Limited Access to Healthy Foods	4%	14%	3%	7%	6%	5%

Appendix B: Kansas County Rankings and BRFSS Data

Kansas County Rankings, 2017 (Out of 102) (9)	Douglas (Lawrence)	Wyandotte (Kansas City)	Johnson (Kansas City)
Health Outcomes	7	101	1
Quality of Life	28	102	1
Health Factors	17	102	1
Health Behaviors	9	101	1
Clinical Care	5	90	1
Social & Economic Factors	36	102	1
Physical Environment	85	98	82

2015 BRFSS Data, Kansas (78-80)	Douglas County (Lawrence)	Wyandotte County (Kansas City)	Johnson County (Kansas City)
% of Adults who Reported Consuming Fruit Less than 1 Time Per Day	39.4% (95% CI: 35.2%-43.6%)	48.2% (95% CI: 44.5-51.9%)	39.2% (95% CI: 37.2%-41.2%)
% of Adults Who Reported Consuming Vegetables Less than 1 Time Per Day	18.7% (95% CI: 15.2%-22.3%)	29.3% (95% CI: 26.0-32.9%)	17.8% (95% CI: 16.2%-19.5%)
% of Adults not Participating in the Recommended Level of Physical Activity (Aerobic and/or Strengthening)	77.8% (95% CI: 74.2%-81.5%)	82.9% (95% CI: 80.1%-85.7%)	76.4% (95% CI: 74.6%-78.1%)
% of Adults Not Participating in Any Physical Activity Other than Their Regular Job in the Past 30 Days (Leisure Time Physical Activity)	20.2% (95% CI: 16.6%-23.7%)	35.2% (95% CI: 31.7%- 38.7%)	18.4% (95% CI: 16.8%-20.0%)
% of Adults Who Reported Their Poor Physical or Mental Health Kept Them From Doing Their Usual Activities, Such as Self-Care, Work or Recreation in the Past 30 Days	36.5% (95% CI: 31.3%- 41.8%)	41.5% (95% CI: 36.9%-46.2%)	38.0% (95% CI: 35.1%-40.9%)
% of Adults with Fair or Poor Self-Perceived Health Status	10.2% (95% CI: 7.9%- 12.5%)	22.2% (95% CI: 19.5%-24.9%)	10.3% (95% CI: 9.1%-11.5%)
% of Adults Who Reported Their Physical Health Was Not Good on 14 or More Days in the Past 30 Days	6.9% (95% CI: 5.1%- 8.7%)	11.7% (95% CI: 9.6%-13.7%)	7.2% (95% CI: 6.2%-8.2%)
% of Adults Who Reported Their Mental Health Was Not Good on 14 or More Days in the Past 30 Days	8.6% (95% CI: 6.1%- 11.1%)	13.4% (95% CI: 11.0%-15.8%)	8.6% (95% CI: 7.3%-9.8%)

Appendix C: Missouri County Rankings and BRFSS Data

Missouri County Rankings, 2017 (Out of 115) (10)	Jackson (Kansas City)	Clay (Kansas City)	St. Louis City (St. Louis)
Health Outcomes	61	3	111
Quality of Life	62	4	112
Health Factors	75	4	114
Health Behaviors	54	3	114
Clinical Care	15	10	32
Social & Economic Factors	92	4	114
Physical Environment	113	107	103

2011 BRFSS Data, Missouri (4)	Jackson County, MO (Kansas City)	Clay County, MO (Kansas City)	St. Louis City County, MO (St. Louis)
Fair or Poor General Health Status	20.6% (95% CI: 17.8% - 23.4%)	18.4% (95% CI: 14.4%- 22.3%)	22.5% (95% CI: 19.0%-25.9%)
Ever been told had High Blood Pressure	33.4% (95% CI: 30.1%- 36.6%)	31.5% (95% CI: 26.9- 36.1%)	34.0% (95% CI: 30.1% - 37.9%)
Ever been told had high cholesterol - among age 35 and older who have had cholesterol checked	44.1% (95% CI: 39.7%- 48.5%)	43.4% (95% CI: 37.5%- 49.3%)	41.9% (95% CI: 37.0%- 46.7%)
Ever been told had a depressive disorder	20.2% (95% CI: 17.3%- 23.1%)	20.2% (95% CI: 16.0%- 24.4%)	23.8% (95% CI: 16.8%- 23.8%)
Ever been told had diabetes	10.4% (8.4%- 12.3%)	9.9% (95% CI: 7.1%- 12.7%)	11.5% (95% CI: 9.2%- 13.9%)
Overweight (25.0-29.9 BMI)	32.6% (95% CI: 29.2%- 36.0%)	36.6% (95% CI: 31.5% - 41.8%)	32.3% (95% CI: 28.1%- 36.3%)
Obese (>=30 BMI)	25.3% (95% CI: 24.5% - 31.0%)	32.1% (95% CI: 27.0%- 37.2%)	30.6% (95% CI: 26.5%- 34.7%)
Strongly agree or agree that it is easy to purchase healthy food in their neighborhood	80.6% (95% CI: 77.8% - 83.4%)	86.6% (95% CI: 83.3%- 90.4%)	76.2% (95% CI: 72.4%- 80.0%)
Ate fruits and vegetables less than 5 times per day	87.4% (95% CI: 85.1%- 89.8%)	89.3% (95% CI: 86.1% - 92.4%)	87.7% (95% CI: 85.1%- 90.4%)

Appendix D: Household Food Expenditure Patterns (40)

Exhibit 1: SNAP and Non-SNAP Household Food Expenditure Patterns

Finding	SNAP Households	Non-SNAP Households
Total annual expenditures on SNAP-eligible foods in dataset	$6.7 billion	$32.3 billion
Percentage of all transactions by all households	12%	88%
Percentage of total annual expenditures by all households	17%	83%
Top 1,000 subcommodity (of 1,792) expenditures as a percentage of all expenditures	99%	98%
Top 100 subcommodity expenditures as a percentage of all expenditures	51%	46%
Top 25 subcommodity expenditures as a percentage of all expenditures	25%	21%
Top 25 commodity (of 238) expenditures as a percentage of all expenditures	45%	41%
Top 10 summary categories (of 30) by expenditure	Meat/Poultry/Seafood	Meat/Poultry/Seafood
	Sweetened Beverages	Vegetables
	Vegetables	High-fat Dairy/Cheese
	Frozen Prepared Foods	Fruits
	Prepared Desserts	Sweetened Beverages
	High-fat Dairy/Cheese	Prepared Desserts
	Bread and Crackers	Bread and Crackers
	Fruits	Frozen Prepared Foods
	Milk	Milk
	Salty Snacks	Salty Snacks
Top 10 commodities (of 238) by expenditure	Soft Drinks	Fluid Milk Products
	Fluid Milk Products	Soft Drinks
	Beef Grinds	Cheese
	Bag Snacks	Baked Breads
	Cheese	Bag Snacks
	Baked Breads	Beef Grinds
	Cold Cereal	Cold Cereal
	Chicken Fresh	Candy – Packaged
	Frozen Handhelds and Snacks	Coffee and Creamers
	Lunchmeat	Ice Cream, Ice Milk, and Sherbets
Top 10 subcommodities (of 1,792) by expenditure	Fluid Milk/White Only	Fluid Milk/White Only
	Soft Drinks 12–18 pack	Soft Drinks 12–18 pack
	Lean Beef	Shredded Cheese
	Kids' Cereal	Chicken Breast – Boneless
	Shredded Cheese	Frozen Premium Nutritional Meals
	2-Liter Soft Drink	Pure Orange Juice – Dairy Case
	Potato Chips	Lean Beef
	Primal Beef	Potato Chips
	Lunchmeat – Deli fresh	Large Eggs
	Infant Formula/Starter Solution	Bananas
USDA Food Pattern categories, by expenditure		
▪ Dairy	9%	10%
▪ Fruits	6%	9%
▪ Grains	12%	13%
▪ Oils	2%	2%
▪ Protein Foods	23%	20%
▪ Solid Fats and Added Sugars	13%	12%
▪ Vegetables	8%	10%
▪ Composite	19%	16%
▪ Other	8%	8%

Source: Foods Typically Purchased by SNAP Households, IMPAQ International, LLC, 2016.

Appendix E: Locations of Double Up Food Bucks Surveys

Geographic Location	Location Type	Location Name
Eastern Kansas	Farmers' Market	Atchison
		Cottin's Hardware Farmers' Market
		Emporia Saturday Market
		Emporia Wednesday Market
		Iola Thursday Market
		Iola Tuesday Market
		Junction City
		Lawrence Saturday Market
		Lawrence Tuesday Market
		Leavenworth Saturday Market
		Leavenworth Wednesday Market
		Manhattan Wednesday Market
		Manhattan Saturday Market
		Perry-Lecompton
		Pittsburg Saturday Market
		Salina Friday Market
		Salina Saturday Market
		Salina Tuesday Market
		Topeka Farmers' Market
	Grocery Store	Price Chopper #20
		Ron's Supermarket
Kansas City	Farmers Market	Brookside
		Cass County Farmers' Market
		City Market
		Gladstone
		Historic Downtown Liberty Farmers' Market
		Independence
		Ivanhoe
		KCK Farmers Market- Central Ave
		KCK- Strawberry Hill
		Mission Flower and Farmers' Market
		North Kansas City
		Northeast Farmers' Market
		Parkville Farmers Market
		Raytown
		Rosedale
		Rosedale-KUMC
		Waldo
	Grocery Store	Cosentino's Price Chopper (Blue Springs)
		Cosentino's Price Chopper (103rd St.)
		Cosentino's Price Chopper (Belton)
		Cosentino's Price Chopper (Liberty)
		Cosentino's Price Chopper (Wilson Rd)
		McKeever's Price Chopper (Independence
		McKeever's Price Chopper (Olathe)
		Price Chopper #6

		Price Chopper #11
		Price Chopper #16
		Price Chopper #25
		Price Chopper #36
		Price Chopper #40
		Queen's Price Chopper
St. Louis	Farmers' Market	Ferguson Farmers' Market
		Midtown Farmers' Market
		Seeds of Hope Farmers' Market
		Thies Farm & Greenhouses
	Grocery Store	City Plaza Schnucks
		Florissant Schnucks
		Grandview Schnucks
		Hampton Village Schnucks
		Lindell Schnucks
		Lindenwood Schnucks
		O'Fallon Schnucks
		Overland Schnucks
		Shackelford Schnucks
		Sierra Vista Schnucks
		Telegraph Schnucks
		Twin Oaks Schnucks
		University City Schnucks
		Westfall Plaza Schnucks
		Zumbehl Schnucks

Appendix F: 2016 Double Up Food Bucks Customer Survey

Double Up Food Bucks Customer Survey

Location Name: _____

Location Type: ___ Grocery store ___ Farmer's market **Today's Date:** _____ **Time:** _____ **Interviewer Initials:** _____

[DETERMINE IF CUSTOMER IS SNAP PARTICIPANT] Do you currently participate in the SNAP or Food Stamp program?

[IF NO] "Thank you for your time but we are only surveying individuals that participate in SNAP."

[IF YES] *Continue with survey.*

[ASK TO DETERMINE ELIGIBILITY] Before we begin, may I ask if you are 18 or over?

[IF NO] "Thank you for your time but I cannot survey anyone under 18."

[IF YES] *Continue with survey.*

[DETERMINE IF CUSTOMER IS DUFB PARTICIPANT] Have you participated in the Double Up Food Bucks program?

___ No **[GO TO QUESTION 1 BELOW]** ___ Yes **[SKIP TO PAGE 2]**

[INTRODUCE SURVEY] "Thank you for taking the time to complete this survey, which is part of an evaluation being conducted by the University of Kansas Medical Center. We have some questions for you about your shopping experience. Your participation is voluntary and should only take a few minutes."

1. **Had you heard of Double Up Food Bucks before shopping today?** ____ Yes ____ No
   [IF YES] How did you hear about the program? Please check all that apply.
   ____ Flyer or brochure ____ Radio ____ Billboard
   ____ Friend or family ____ On the news ____ Mail received at home
   ____ At the grocery store ____ Bus ad ____ Internet
   ____ At the farmers market
   ____ Community organization, agency or school *(Please provide the name)*_____
   ____ Other *(Please describe)*_____

2. **[IF NO TO Q1] Did you learn about Double Up Food Bucks while shopping today?** ____ Yes ____ No
   [IF NO TO Q2, EXPLAIN PROGRAM TO CUSTOMER]

3. **Is there a reason you did not want to participate in Double Up Food Bucks today?**
   ____ No reason ____ Didn't know about program ____ Didn't understand program
   ____ Didn't buy produce ____ Didn't have money on EBT card
   ____ Other (*Please describe*) _____

4. **How likely are you to participate in Double Up Food Bucks the next time you are shopping at this location?**
   ____ Not very likely ____ Somewhat likely ____ Very likely

5. **What is your zip code?** _____

6. **In what year were you born?** _____

Thank you for participating in this survey!

1

[INTRODUCE SURVEY] "Thank you for taking the time to complete this survey, which is part of an evaluation being conducted by the University of Kansas Medical Center. We have some questions for you about your experience with the Double Up Food Bucks program. This survey should take about 10 minutes to complete and you will receive a reusable Double Up Food Bucks token/grocery bag in exchange for your time. Your responses will help us learn about people's experiences with the Double Up Food Bucks program and will help us improve the program. We will ask some questions about your participation in Double Up Food Bucks and also some questions about you and your health. Participation in this survey is voluntary and you are not required to answer all the questions. You may also stop the survey at any time. Do you have any questions before we get started?"

7. **How did you hear about the Double Up Food Bucks program? Please check *all* that apply.**

____ Flyer or brochure	____ Radio	____ Billboard
____ Friend or family	____ On the news	____ Mail received at home
____ At the grocery store	____ Bus ad	____ Internet
____ At the farmers market		

____ Community organization, agency or school *(Please provide the name)*_____

____ Other *(Please describe)*_____

8. **What <u>fresh fruits,</u> if any, did you buy today with SNAP or DUFB?**

Please check *all* that apply. Do *not* include canned or frozen fruits.

___ Apples	___ Citrus fruits (oranges, lemons, etc)	___ Peaches
___ Apricots	___ Grapes	___ Pears
___ Blackberries	___ Melons (cantaloupe, watermelon, etc)	___ Plums
___ Blueberries	___ Nectarines	___ Raspberries
___ Cherries		___ Strawberries

Others _____

9. **What <u>fresh vegetables,</u> if any, did you buy today with SNAP or DUFB?**

Please check *all* that apply. Do *not* include canned/frozen vegetables.

___ Beets	___ Green Beans	___ Peas
___ Broccoli	___ Greens	___ Potatoes
___ Carrots	___ Kale	___ Spinach
___ Corn	___ Lettuce	___ Squash
___ Cucumbers	___ Mushrooms	___ Tomatoes
___ Eggplant	___ Onions	___ Zucchini, other summer squash

Others _____

[IF SURVEYING AT A <u>GROCERY STORE</u>:]

10. **How easy or difficult would you say it was to *identify* fresh, local fruits and vegetables that qualify for DUFB?**

____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

[IF SURVEYING AT A <u>FARMERS MARKET</u>:]

10. **How easy or difficult would you say it was to *identify* which vendors sold fresh fruits and vegetables you can buy with DUFB tokens?**
____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

11. **How easy or difficult would you say it was to *purchase* fresh fruits and vegetables with DUFB?**
____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

12. **About how many times have you used Double Up Food Bucks this year?**

_____

[IF ANSWER TO Q12 IS "1" OR "THIS IS MY FIRST TIME", SKIP TO Q15]

13. **Would you say that because of Double Up Food Bucks…**	**Increased**	**Remained the same**	**Decreased**
The amount of fresh fruits and vegetables that you *buy* has:	____	____	____
The amount of fresh fruits and vegetables that you *eat* has:	____	____	____
The *variety* of fresh fruits and vegetables that you eat has:	____	____	____
The amount of potato chips, candy and cookies you eat has:	____	____	____

14. **Has the Double Up Food Bucks program helped you afford more fruits and vegetables?**
____ Yes ____ No

15. **Would you recommend this program to other customers? Why or why not?** ____ Yes ____ No

_____

_____

16. **In what year were you born?** _____

[SURVEYOR INDICATE GENDER – DO NOT ASK] ____ Male ____ Female

17. **What is your zip code?** _____

18. **Including yourself, how many individuals live in your household?** _____

19. **How many individuals *under 18* live in your household?** _____

20. **In what type of store do you typically shop for fruits and vegetables?**
____ Supermarket ____ Mass merchandiser (Costco, Sam's Club) ____ Convenience store
____ Other (*Please describe*) _____

21. **How important is it to you that the fruits and vegetables you purchase are locally grown?**
____ Not important ____ Slightly important ____ Very important

22. **How important do you think eating fruits and vegetables is to your health?**
____ Not important ____ Slightly important ____ Very important

23. **How many servings of *fruit* do you usually eat or drink each day?**
[IF RESPONDENT IS UNSURE]: "Think of a serving as being about 1 medium piece, or ½ cup of fruit, or ¾ cup of fruit juice."

_____

24. **How many servings of *vegetables* do you usually eat or drink each day?**
[IF RESPONDENT IS UNSURE]: "Think of a serving as being about 1 cup of raw leafy vegetables, ½ cup of other cooked or raw vegetables, or ¾ cup of vegetable juice."

_____

25. **Within the past 12 months, did you ever *worry* whether your food would run out before you got money to buy more?** ____ Yes ____ No

26. **Within the past 12 months, did the food you buy ever *just not last* and you didn't have money to get more?**
____ Yes ____ No

27. **Would you say that in *general* your health is:**
____ Excellent ____ Very good ____ Good ____ Fair ____ Poor

28. **Thinking about your *physical health*, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?**

_____

29. **Thinking about your *mental health*, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?**

_____

30. **During the past 30 days, for about how many days did poor physical or mental health keep you from doing your *usual activities*, such as self-care, work, or recreation?**

_____

Thank you for participating in this survey!

Appendix G: 2017 Double Up Food Bucks Customer Survey

Double Up Food Bucks Customer Survey

Location Name: _____

Location Type: ___ Grocery store ___ Farmer's market **Today's Date:** _____ **Time:** _____ **Interviewer Initials:** _____

[DETERMINE IF CUSTOMER IS SNAP PARTICIPANT] Do you currently participate in the SNAP or Food Stamp program?

[IF NO] "Thank you for your time but we are only surveying individuals that participate in SNAP."

[IF YES] *Continue with survey.*

[ASK TO DETERMINE ELIGIBILITY] Before we begin, may I ask if you are 18 or over?

[IF NO] "Thank you for your time but I cannot survey anyone under 18."

[IF YES] *Continue with survey.*

[DETERMINE IF CUSTOMER HAS PREVIOUSLY COMPLETED A DUFB SURVEY] Have you previously completed a survey about the DUFB program at a farmers market or grocery store?

[IF YES] "Thank you for your time but we are only surveying individuals who have not been surveyed before."

[IF NO] *Continue with survey.*

[DETERMINE IF CUSTOMER IS DUFB PARTICIPANT] Have you participated in the Double Up Food Bucks program?

___ No **[GO TO PAGE 2]**

___ Yes **[GO TO PAGE 3]**

SNAP Customers who have not used DUFB

[INTRODUCE SURVEY] "Thank you for taking the time to complete this survey, which is part of an evaluation being conducted by the University of Kansas Medical Center. We have some questions for you about your shopping experience. Your participation is voluntary and should only take a few minutes."

1. **Had you heard of Double Up Food Bucks before shopping today?** ____ Yes ____ No
   [IF YES] How did you hear about the program? Please check all that apply.
   ____ Flyer or brochure ____ Radio ____ Billboard
   ____ Friend or family ____ On the news ____ Mail received at home
   ____ At the grocery store ____ Bus ad ____ Internet
   ____ At the farmers market ____ Phone app (e.g., Fresh EBT – Food Stamp Balance)
   ____ Community organization, agency or school *(Please provide the name)*_____
   ____ Other *(Please describe)*_____

2. **[IF NO TO Q1] Did you learn about Double Up Food Bucks while shopping today?** ____ Yes ____ No
   [IF NO TO Q2, EXPLAIN PROGRAM TO CUSTOMER]

3. **Is there a reason you did not want to participate in Double Up Food Bucks today?**
   ____ No reason ____ Didn't know about program ____ Didn't understand program
   ____ Didn't buy produce ____ Didn't have money on EBT card
   ____ Other (*Please describe*) _____

4. **How likely are you to participate in Double Up Food Bucks the next time you are shopping at this location?**
   ____ Not very likely ____ Somewhat likely ____ Very likely

5. **What is your zip code?** _____

6. **In what year were you born?** _____

7. **How do you typically travel to the market or store?**
   ____ Walk ____ Public transportation ____ Ride with family/friend
   ____ Drive ____ Bike
   ____ Other *(Please describe)* _____

8. **Which would you say best represents your race/ethnicity? (select all that apply)**
   ____ Caucasian/White (not Hispanic) ____ African American/Black ____ Hispanic/Latino
   ____ Asian ____ Native American
   ____ Other *(Please describe)*: _____

Thank you for participating in this survey!

DUFB Customers

[INTRODUCE SURVEY] "Thank you for taking the time to complete this survey, which is part of an evaluation being conducted by the University of Kansas Medical Center. We have some questions for you about your experience with the Double Up Food Bucks program. This survey should take about 10 minutes to complete and you will receive a reusable Double Up Food Bucks token/grocery bag in exchange for your time. Your responses will help us learn about people's experiences with the Double Up Food Bucks program and will help us improve the program. We will ask some questions about your participation in Double Up Food Bucks and also some questions about you and your health. Participation in this survey is voluntary and you are not required to answer all the questions. You may also stop the survey at any time. Do you have any questions before we get started?"

1. **How did you hear about the Double Up Food Bucks program? Please check *all* that apply.**

____ Flyer or brochure	____ Radio	____ Billboard
____ Friend or family	____ On the news	____ Mail received at home
____ At the grocery store	____ Bus ad	____ Internet
____ At the farmers market	____ Phone app (e.g., Fresh EBT – Food Stamp Balance)	

____ Community organization, agency or school *(Please provide the name)*_____

____ Other *(Please describe)*_____

2. **What <u>fresh fruits,</u> if any, did you buy today with SNAP or DUFB?**

Please check *all* that apply. Do *not* include canned or frozen fruits.

___ Apples	___ Citrus fruits (oranges, lemons, etc)	___ Peaches
___ Apricots	___ Grapes	___ Pears
___ Blackberries	___ Melons (cantaloupe, watermelon, etc)	___ Plums
___ Blueberries	___ Nectarines	___ Raspberries
___ Cherries		___ Strawberries

Others _____

3. **What <u>fresh vegetables,</u> if any, did you buy today with SNAP or DUFB?**

Please check *all* that apply. Do *not* include canned/frozen vegetables.

___ Beets	___ Greens	___ Peppers
___ Broccoli	___ Kale	___ Potatoes
___ Carrots	___ Lettuce	___ Spinach
___ Corn	___ Mushrooms	___ Squash
___ Cucumbers	___ Onions	___ Tomatoes
___ Eggplant	___ Peas	___ Zucchini, other summer squash
___ Green Beans		

Others _____

[IF SURVEYING AT A <u>GROCERY STORE</u>:]

4. **How easy or difficult would you say it was to *identify* fresh, local fruits and vegetables that qualify for DUFB?**
   ____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

[IF SURVEYING AT A FARMERS MARKET:]

4. How easy or difficult would you say it was to *identify* which vendors sold fresh fruits and vegetables you can buy with DUFB tokens?
   ____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

5. **How easy or difficult would you say it was to *purchase* fresh fruits and vegetables with DUFB?**
   ____ Very easy ____ Somewhat easy ____ Somewhat difficult ____ Very difficult

6. **About how many times have you used Double Up Food Bucks this year?**

   _____

[IF ANSWER TO Q6 IS "1" OR "THIS IS MY FIRST TIME", SKIP TO Q10]

7. **Would you say that because of Double Up Food Bucks…**	**Increased**	**Remained the same**	**Decreased**
The amount of fresh fruits and vegetables that you *buy* has:	____	____	____
The amount of fresh fruits and vegetables that you *eat* has:	____	____	____
The *variety* of fresh fruits and vegetables that you eat has:	____	____	____
The amount of potato chips, candy and cookies you eat has:	____	____	____

8. **Has the Double Up Food Bucks program helped you afford more fruits and vegetables?**
   ____ Yes ____ No

9. **Would you recommend this program to other customers? Why or why not?** ____ Yes ____ No

   _____

   _____

10. **In what year were you born?** _____

[SURVEYOR INDICATE GENDER] ____ Male ____ Female

11. **What is your zip code?** _____

12. **Which would you say best represents your race/ethnicity? (select all that apply)**
    ____ Caucasian/White (not Hispanic) ____ African American/Black ____ Hispanic/Latino
    ____ Asian ____ Native American
    ____ Other *(Please describe)*: _____

13. **How do you typically travel to the market or store?**
    ____ Walk ____ Public transportation ____ Ride with family/friend
    ____ Drive ____ Bike
    ____ Other *(Please describe)* _____

14. **Including yourself, how many individuals live in your household?** _____

15. **How many individuals *under 18* live in your household?** _____

16. **In what type of store do you typically shop for fruits and vegetables?**
    ____ Supermarket ____ Mass merchandiser (Costco, Sam's Club) ____ Convenience store
    ____ Other (*Please describe*) _____

[IF SURVEYING AT A FARMERS MARKET:]

17. **In a typical month, how often do you shop at the farmers market for fruits and vegetables?**
    ____ Less than once a month ____ Once a month ____ 2-3 times a month
    ____ Once a week ____ More than once a week

18. **How important is it to you that the fruits and vegetables you purchase are locally grown?**
    ____ Not important ____ Slightly important ____ Very important

19. **How important do you think eating fruits and vegetables is to your health?**
    ____ Not important ____ Slightly important ____ Very important

20. **How many servings of *fruit* do you usually eat or drink each day?**
    [IF RESPONDENT IS UNSURE]: "Think of a serving as being about 1 medium piece, or ½ cup of fruit, or ¾ cup of fruit juice."

    _____

21. **How do you typically prepare the fruits that you eat?**
    ____ Eat them raw ____ Steam ____ Grill ___ Microwave

____ Boil ____ Roast ____ Fry
____ Other (*Please describe*) _____

22. **How many servings of *vegetables* do you usually eat or drink each day?**
[IF RESPONDENT IS UNSURE]: "Think of a serving as being about 1 cup of raw leafy vegetables, ½ cup of other cooked or raw vegetables, or ¾ cup of vegetable juice."

_____

23. **How do you typically prepare the vegetables that you eat?**
____ Eat them raw ____ Steam ____ Grill ___ Microwave
____ Boil ____ Roast ____ Fry
____ Other (*Please describe*) _____

24. **Within the past 12 months, did you ever *worry* whether your food would run out before you got money to buy more?** ____ Yes ____ No

25. **Within the past 12 months, did the food you buy ever *just not last* and you didn't have money to get more?**
____ Yes ____ No

26. **Would you say that in *general* your health is:**
____ Excellent ____ Very good ____ Good ____ Fair ____ Poor

27. **Thinking about your *physical health*, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?**

_____

28. **Thinking about your *mental health*, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?**

_____

29. **During the past 30 days, for about how many days did poor physical or mental health keep you from doing your *usual activities*, such as self-care, work, or recreation?**

_____

Thank you for participating in this survey!